WHAT IS CLAIMED IS:

1. A composition comprising particulate tricalcium phosphate (TCP) having an average particle size of about 5 μm or less, an average crystal size of about 250 nm or less and a surface area of about 20 m^2/g or greater.

2. The composition of claim 1, wherein the particulate TCP has an average particle size of about 1 μm or less.

3. The composition of claim 1, wherein the particulate TCP has an average crystal size of about 200 nm or less.

4. The composition of claim 1, wherein the particulate TCP comprises α-TCP, β-TCP, or a combination thereof.

5. The composition of claim 1, wherein the particulate tricalcium phosphate is densified.

6. The composition of claim 1, further comprising a secondary additive.

7. The composition of claim 6, wherein the secondary additive is present in an amount of between about 1% and about 50% by volume.

8. The composition of claim 6, wherein the secondary additive comprises a structural additive.

9. The composition of claim 8, wherein the structural additive comprises a metal oxide.

10. The composition of claim 9, wherein the metal oxide comprises zirconia.

11. The composition of claim 8, wherein the structural additive has an aspect ratio of about 2 or greater.

12. The composition of claim 6, wherein the secondary additive is an organic species.

13. The composition of claim 6, wherein the secondary additive is a polymeric additive.

14. The composition of claim 13, wherein the polymeric additive is selected from the group consisting of polylactic acid, polyglycolic acid, polylactic/polyglycolic acid copolymers, polypropylenefumarate, polyhydroxybutyric acid, polyhydroxyvaleric acid, polycaprolactone, polyhydroxycarboxylic acids, polybutyrene succinate, polybutylene adipate, collagen, chitosan, alginate, celluloses, starches, sugars, polypeptides, polyethylene glycols, vinyl pyrrolidones, acrylamides, methacrylates, copolymer micelles, and combinations thereof.

15. The composition of claim 6, wherein the secondary additive is a biological additive.

16. The composition of claim 15, wherein the biological additive is selected from the group consisting of plasmid DNA, RNA, proteins, bone morphogenetic proteins, and combinations thereof.

17. The composition of claim 6, wherein the secondary additive is a pharmaceutical additive.

18. An article comprising a consolidated TCP structure having an average crystal size of about 80 μm or less and a density of about 90% of the theoretical density or greater.

19. The article of claim 18, wherein the article has a density of about 95% or greater.

20. The article of claim 18, wherein the article has a void volume of about 10% or less.

21. The article of claim 18, wherein the TCP structure has an average crystal size of about 10 μm or less.

22. The article of claim 21, wherein the TCP structure has an average crystal size of about 1 μm or less.

23. The article of claim 22, wherein the TCP structure has an average crystal size of about 500 nm or less.

24. The article of claim 18, wherein the TCP structure has a three-point bending strength of about 100 MPa or greater.

25. The article of claim 24, wherein the TCP structure has a three-point bending strength of about 200 MPa or greater.

26. The article of claim 18, wherein TCP structure comprises α-TCP, β-TCP, or a combination thereof.

27. The article of claim 18, wherein the article has a dimension of at least about 0.5 cm.

28. The article of claim 18, wherein the article is a prosthesis.

29. The article of claim 18, wherein the article is at least part of a prosthesis.

30. The article of claim 18, wherein the article comprises an exterior coating on a prosthesis.

31. The article of claim 18, wherein the article is a bioactive implant.

32. The article of claim 31, wherein the bioactive implant is an orthopedic or dental implant.

33. The article of claim 18, wherein the apatite structure comprises a secondary additive.

34. The article of claim 33, wherein the secondary additive comprises a structural additive.

35. The article of claim 34, wherein the structural additive comprises a metal oxide.

36. The article of claim 33, wherein the secondary additive is nanocrystalline.

37. The article of claim 33, wherein the secondary additive is a metal or alloy.

38. The article of claim 33, wherein the secondary additive is added in an amount of between about 1% and about 50% by volume.

39. An article comprising a consolidated TCP structure having an average crystal size of about 1 μm or less and a porosity of about 20% or greater.

40. The article of claim 39, wherein the TCP structure has a porosity of about 40% or greater.

41. The article of claim 39, wherein the TCP structure has an average pore size of about 300 μm or less.

42. The article of claim 39, wherein the TCP structure has a compressive strength of about 100 MPa or greater.

43. The article of claim 39, wherein the TCP structure has an average crystal size of about 250 nm or less.

44. The article of claim 39, wherein the TCP structure comprises α-TCP, β-TCP, or a combination thereof.

45. The article of claim 39, wherein the article has a dimension of at least about 0.5 cm.

46. The article of claim 39, wherein the article is a prosthesis.

47. The article of claim 39, wherein the article is at least part of a prosthesis.

48. The article of claim 39, wherein the article comprises an exterior coating on a prosthesis.

49. The article of claim 39, wherein the article is a bioactive implant.

50. The article of claim 49, wherein the bioactive implant is an orthopedic or dental implant.

51. The article of claim 39, wherein the apatite structure comprises a secondary additive.

52. The article of claim 51, wherein the secondary additive is an organic additive.

53. The article of claim 51, wherein the secondary additive is a polymeric additive.

54. The article of claim 53, wherein the polymeric additive is selected from the group consisting of polylactic acid, polyglycolic acid, polylactic/polyglycolic acid copolymers, polypropylenefumarate, polyhydroxybutyric acid, polyhydroxyvaleric acid, polycaprolactone, polyhydroxycarboxylic acids, polybutyrene succinate, polybutylene adipate, collagen, chitosan, alginate, celluloses, starches, sugars, polypeptides, polyethylene glycols, vinyl pyrrolidones, acrylamides, methacrylates, copolymer micelles, and combinations thereof.

55. The article of claim 51, wherein the secondary additive is a biological additive.

56. The article of claim 55, wherein the biological additive is selected from the group consisting of plasmid DNA, RNA, proteins, bone morphogenetic proteins, and combinations thereof.

57. The article of claim 51, wherein the secondary additive is a pharmaceutical additive.

58. The article of claim 57, wherein the pharmaceutical additive is selected from the group consisting of bisphosphonates, cis-platinum compounds, antibiotics, anti-inflammatory agents, anti-arthritism agents, erythropoeitin, and combinations thereof.

59. The article of claim 51, wherein the secondary additive is hydroxyapatite.

60. The article of claim 51, wherein the secondary additive is added in an amount of between about 1% and about 50% by volume.

61. An implant comprising TCP having an average crystal size of about 7 μm or less, a density of about 90% theoretical density or greater, and a three-point bending strength of about 100 MPa or greater.

62. The implant of claim 61, wherein the implant comprises α-TCP, β-TCP, or a combination thereof.

63. The implant of claim 61, wherein the implant is a spinal implant.

64. The implant of claim 61, wherein the implant is a dental implant.

65. The implant of claim 61, wherein the implant is an internal or external fixation implant.

66. The implant of claim 61, wherein the implant is an implant for soft tissue attachment.

67. The implant of claim 61, wherein the implant has a resorption time of about 3 months or more.

68. The implant of claim 67, wherein the implant has a resorption time of about 1 year or more.